

REMARKS

Consideration is requested.

The claims are 56 to 59, 61 to 69 and 71 to 80.

All of the claims were rejected on Miller et al. United States Patent No. 5,034,030 in view of Japanese Patent Publication No. 08-071372 ('372), and Japanese '372 in view of Miller et al.

According to Miller et al., the patent is drawn to particulate conditioning prior to the collection of particulate matter such as fly ash found in combustion gas streams. Atmospheric emission of particulate matter from the emission stack of a coal combustion power plant is said to be achieved by injecting upstream of the power plant fabric filters small amounts of ammonia gas and sulfur trioxide. The ammonia is injected upstream of the sulfur trioxide at a sufficient distance to achieve adsorption on the surface of fly ash before mixing with sulfur trioxide. This conditioning is intended to achieve a decrease in particulate emissions.

Miller et al. has nothing to do with NO_x scrubbing. Miller et al. does not even disclose where the ammonia originates or how it is generated or how the ammonia production rate from some source is governed.

The Japanese '372 patent publication refers to a method of producing a gaseous ammonia product from urea, which method involves feeding an aqueous solution of urea to a heated reactor and therein catalytically hydrolyzing the urea to a gaseous product stream comprising ammonia, carbon dioxide, and water. The disclosure of '372 is unclear and leaves it largely up to the reader to supply the essentials of an actual operational process. The pressure at which the urea is hydrolyzed is never specified. '372 states that hydrolysis of urea can be promoted by attaining a boiling point "above 100°C", with 110°C apparently being preferred, see '372 translation at Figures 4 and 5. As shown in Figure 7 of the present patent application, though, the production of ammonia at 110°C is extremely low. Since '372 does not specify the pressure, it is difficult to ascribe any definite outcome to the process generally referred to in '372. However, the water of hydrolysis normally boils at 100°C and the addition of inorganic salts as catalysts, as referred to in '372, would raise the boiling point to as much as 110°C at atmospheric pressure. The presence of dissolved urea itself, as well as catalyst in the aqueous solution, raises the boiling point. Thus, if a solution boils at 110°C, it is almost certainly at atmospheric pressure. The reasonable understanding of '372 is therefore that the process operates at atmospheric pressure, and the "boiling" disclosed in '372 also occurs at one atmosphere absolute. There is no pressure head of ammonia in removing NO_x. Moreover, '372 states at the middle of page 14 of the translation:

...by increasing the concentration of the catalyst solution and being able to raise the boiling point to 100°C and above, the hydrolysis reaction of the urea is promoted. (emphasis added).

Thus, the '372 patent teaches that the catalyst concentration in the urea hydrolysis solution is relied upon to govern the production rate of ammonia. This is clearly different from the present invention and teaches away from reliance on the quantity of solution in the reactor to govern the ammonia production rate.

The virtue of manipulating the quantity of aqueous solution in the hydrolysis reactor to provide a pressurized ammonia-catalyst gas stream, as claimed in the present patent application, is that the pressure head of gas in the reactor can be readily controlled so that the ammonia gas is instantly available for controlled release in response to surges in NO_x or particulate matter levels. The pressurized gas flow rate for external use can likewise be rapidly cut back, for example, by turning a valve, when the demand for ammonia drops and the quantity of solution in the hydrolysis reactor reduced to maintain an acceptable pressure head of ammonia gas in the reactor.

In '372, "an aqueous urea solution (a) is pressure fed...from storage tank (7) by means of pump (8)...into blending device (9)". However, there is no pressurized aqueous urea solution disclosed in '372. The pump (8) produces sufficient force to propel the aqueous urea solution into the blending device (9). Pump (11) pumps the catalyst solution into blending device (9), '372 translation, last paragraph on page 15.

The catalyst pump (11) is operated to govern the urea hydrolysis rate. The quantity of solution in the blending device is not manipulated.

Miller et al. and '372 relate to mutually different technical fields. The person skilled in the art concerned with '372 would not therefore consider Miller et al. '372 relates to NO_x removal from combustion gases to reduce atmospheric air pollution, whereas Miller et al. is directed to conditioning of particulate matter using ammonia without, however, specifying any ammonia source, and without any suggestion of a highly pressurized ammonia source available for response to changes in demand.

The combination of '372 and Miller et al. does not in any event lead to a process falling within the scope of present claim 1, for the same reason discussed above with respect to D1 and Miller et al. There is no teaching in either '372 or Miller et al. that the released ammonia-containing gas stream is matched to demand in the flue gas, with the ability to rapidly change the flow of ammonia-containing gas in response to changes in demand of the flue gas. A combination of '372 and Miller et al. does not therefore lead to any subject matter falling within the scope of the present claims.

The Examiner argues that the ammonia production rate in Japanese '372 would be governed by the urea concentration in the reactor. While it would be correct to say that whatever the urea concentration in the reactor of '372 inherently has an ammonia production rate at the 100°-110°C urea solution temperature disclosed in '372, this is not a teaching of the quantity of urea solution in the reactor governing the ammonia

production rate. No such correlation is disclosed. To the contrary, the '372 patent, which is quite sketchy, ties only the temperature of the urea solution to the ammonia evolution. There is no suggestion of reliance on the quantity of urea solution in the reactor or device 9 of the '372 patent.

The rejection on Miller et al. with Japanese '372 should be withdrawn.

All of the claims were rejected as anticipated by admitted prior art. This rejection should be withdrawn. There is no known prior art which, in any relevant context, uses the quantity of urea solution in a hydrolysis reactor to govern the production rate of ammonia for the scrubbing of NO_x from combustion gas streams.

The rejection should be withdrawn.

All of the claims were rejected under 35 U.S.C. 112, first paragraph. The required description support is found in the patent application as filed, see original claim 4, preceding the Preliminary Amendment of September 15, 2003. There it is disclosed that the rate of production of ammonia is controlled thermally and by the quantity of solution in the reactor.

This disclosure clearly supports the claims as revised hereinabove.

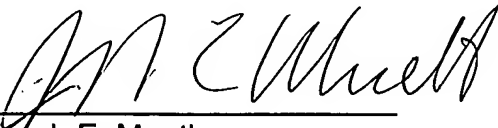
The rejection under 35 U.S.C. 112, first paragraph, should be withdrawn.

A Terminal Disclaimer is being filed herewith with respect to the double patenting rejection over claims of United States Patent Nos. 6,077,491, 6,506,350 and 6,730,280. The rejection for double patenting should be withdrawn.

The double patenting rejection over claims of United States Patent No. 6,322,762 must be withdrawn. This patent does not claim NO_x scrubbing. The claims of United States Patent No. 6,322,762 are drawn to the conditioning of particulate matter to facilitate their collection in baghouses and the like, and was divided under 35 U.S.C. 1.21 at the insistence of the United States Patent and Trademark Office from United States Patent Application Serial No. 08/822,932 filed March 21, 1997 which eventuated in United States Patent No. 6,077,491.

The Notice of Allowance is requested.

Respectfully submitted,

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